

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
Washington, D.C.

in its capacity as elected Office

Date of mailing: 15 November 1994 (15.11.94)	
International application No.: PCT/US94/00925	Applicant's or agent's file reference: 40,076A-F
International filing date: 27 January 1994 (27.01.94)	Priority date: 02 April 1993 (02.04.93)
Applicant: DUNMEAD, Stephen, D. et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
10 October 1994 (10.10.94)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

B. Morariu

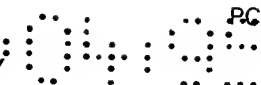
Telephone No.: (41-22) 730.91.11

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PCT/US94/00925

PATENT COOPERATION TREATY



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From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING
DOCUMENT TRANSMITTED

To:

United States Patent and Trademark
Office
(Box PCT)
Washington D.C. 20231
United States of America

in its capacity as elected Office

Date of mailing:

11 April 1995 (11.04.95)

International application No.:

PCT/US94/00925

International filing date:

27 January 1994 (27.01.94)

Applicant:

THE DOW CHEMICAL COMPANY et al

The International Bureau transmits herewith the following documents and number thereof:

_____ copy of the international preliminary examination report and annexes (Article 36(3)(a))

Already filed

26.03.95

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorised officer:

P. Asseff

Telephone No.: (41-22) 730.91.11

REC'D 07 APR 1995

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)


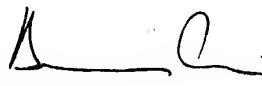
Applicant's or agent's file reference 40,076A-F	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US 94/ 00925	International filing date (day/month/year) 27/01/1994	Priority date (day/month/year) 02/04/1993
International Patent Classification (IPC) or national classification and IPC C04B35/38		
Applicant THE DOW CHEMICAL CO. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This **REPORT** consists of a total of 5 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of 3 sheets.

3. This report contains indications and corresponding pages relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 10/10/1994	Date of completion of this report 05.04.95
Name and mailing address of the IPEA:  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epinu d Fax: (+49-89) 2399-4465	Authorized officer  Telephone No. 8560 A. Mini

14:04:55

Intern. application No.

PCT/US94/00925

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

I. Basis of the report

1. This report has been drawn up on the basis of (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.):

☐ the international application as originally filed.

☒ the description, pages 1-18, 21-25 _____, as originally filed,
pages _____, filed with the demand,
pages 19, 20 _____, filed with the letter of 18.03.94,
pages _____, filed with the letter of _____,

☒ the claims, Nos. 1-16 _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. 17-22 _____, filed with the letter of 09.02.95,
Nos. _____, filed with the letter of _____,

☐ the drawings, sheets/fig _____, as originally filed,
sheets/fig _____, filed with the demand,
sheets/fig _____, filed with the letter of _____,
sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____.

☐ the claims, Nos. _____.

☐ the drawings, sheets/fig _____.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

140495

Intern. application No.

PCT/US94/00925

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims 1-19, 21_____	YES
	Claims 20, 22_____	NO
Inventive Step (IS)	Claims 1-19, 21_____	YES
	Claims 20, 22_____	NO
Industrial Applicability (IA)	Claims 1-22_____	YES
	Claims _____	NO

2. CITATIONS AND EXPLANATIONS

1. None of the cited documents describes a process for producing AlN; AlN-platelets; AlN-complex transition metal carbide and/or boride composites and AlN containing solid solution by combustion synthesis whereby the raw material ignition takes place in the presence of gaseous nitrogen at a pressure of from 0.075 to 3 MPa).

This teaching goes against the suggestion of the closest prior art document US-A-4988645 (D1) which suggests to operate at a nitrogen pressure between 7 and 310 MPa.

Therefore, the subject-matter of Claims 1 to 19 is considered to be novel and to involve an inventive step.

2. Document US-A-4988645 (D1) describes a method for producing ceramic-metal composites and particularly AlN-Al composites of porous structure which may be infiltrated with molten metal (eg Al or Al alloys). Applicant could not convincingly demonstrate and the application does not contain any indication that AlN-Al composites of po-

14:04:35

Intern. application No.

PCT/US94/00925

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

rous structure obtained by applying a process according to the invention are necessary different from those made according to prior art processes, in particular document D1 (cf. col. 5, line 14 - col 6 line 2 and Claim 18). Indeed, a product is not rendered novel by the mere fact that it is produced by means of a new process.

Therefore, the subject-matter of Claims 20 and 22 is not considered to be novel.

3. None of the cited documents describes or suggests a body of AlN; AlN-platelets; AlN-complex transition metal carbide and/or boride composites and AlN containing solid solution which are infiltrated by polymers.

Therefore, the subject-matter of Claim 21 is considered to be novel and to involve an inventive step.

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Intern. application No.

PCT/US94/00925

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

To meet the requirements of Art. 41(2) PCT Claim 21 should be amended to specify that the AlN-based body to be polymer infiltrated is produced by the method of Claim 1.

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17. A method as claimed in Claim 16 wherein the method further comprises a step intermediate between steps (b) and (c) in which the porous body is coated with a silicate material and subsequently cured at a temperature of 120°C for 0.5 - 2 hours and then cured at a temperature of 550 - 600°C for 0.5 - 2 hours.

18. A method as claimed in Claim 17, wherein the silicate material is coated onto internal and external surfaces of the porous body using a coating solution comprising a linear or branched alkyl or alkoxyalkyl silicate, an alkyl alcohol having from 1 to 4 carbon atoms, inclusive, water and, optionally, a hydrolysis catalyst.

19. A method as claimed in Claim 18, wherein the coating solution comprises tetraethylorthosilicate, absolute ethanol, water and acetic acid.

20. An AlN platelet, an AlN-complex transition metal carbide composite, an AlN-complex transition metal boride composite or an AlN-containing solid solution prepared by the method of Claim 1.

21. A polymer infiltrated body, wherein at least one polymer is infiltrated into a porous body selected from the group of: AlN; AlN platelet; AlN-complex transition metal carbide composite; AlN-complex transition metal boride composite and AlN containing solid solution.

22. A metal infiltrated body, wherein at least one metal is infiltrated into a porous body selected from the group of: AlN platelet; AlN-complex transition metal carbide composite; AlN-complex transition metal boride composite; AlN containing solid solution, wherein said AlN platelet, AlN-complex transition metal carbide composite, AlN-complex transition metal boride composite or AlN containing solid solution porous body is prepared by the method of Claim 16.

AMENDED SHEET

-19-

Table IV

Example	Al Source	% Al	% C	% AlN	Density (g/cm ³)	Yield (% of theoretical)	Morphology Description
A	Al-2	90	10	0	0.75	--	Large (5 X 50 μ m) platelets
B	Al-2	90	5	5	0.70	--	Fine (1-2 μ m) equiaxed
C	Al-1	80	10	10	0.40	--	Large (4 x 40 μ m) platelets
D	Al-1	85	5	10	0.50	--	Fine (1-3 μ m) equiaxed
E	Al-1	85	10	5	0.60	--	Mixture of large and small platelets (1 x 10 μ m and 5 x 50 μ m)
F	Al-1	90	5	5	0.42	--	Mixture of platelets and equiaxed crystals
G*	Al-2	95	5	0	0.83	0	--
H*	Al-2	95	5	0	0.76	0	--
I	Al-2	90	10	0	0.70	68	--
J	Al-2	90	10	0	0.92	68	Large (4 x 60 μ m) platelets
K	Al-2	90	10	0	1.18	29	--
L*	Al-2	95	5	0	0.80	0	--
M	Al-2	35	65	0	0.21	30	--
N	Al-2	35	65	0	0.18	12	--

* = Not an Example of the invention; -- = not measured

- 20 -

Table IV

Example	Al Source	% Al	% C	% AlN	Density (g/cm ³)	Yield (% of theoretical)	Morphology Description
O	Al-2	50	50	0	0.26	68	--
P	Al-2	70	30	0	0.32	72	--
Q	Al-2	70	30	0	0.50	66	Small (0.6 x 10 μ m) platelets
R	Al-2	70	30	0	0.73	51	--
S	Al-2	50	50	0	0.39	83	Small (1 x 10 μ m) platelets
T	Al-2	50	50	0	0.49	76	--
U	Al-2	35	65	0	0.40	96	Mixture of small (1 x 10 μ m) platelets and fine (103 μ m) equiaxed crystals
V	Al-2	50	50	0	0.53	68	--

* = Not an Example of the invention; -- = not measured

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 40,076A-F	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US 94/00925	International filing date (<i>day/month/year</i>) 27 January 1994	(Earliest) Priority Date (<i>day/month/year</i>) 2 April 1993
Applicant THE DOW CHEMICAL COMPANY et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).

2. ☐ Unity of invention is lacking (See Box II).

3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ transcribed by this Authority.

4. With regard to the title, ☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. ---

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

SA 86103

INTERNATIONAL SEARCH REPORT
Information on patent family members

16/04/94

International application No.

PCT/US 94/00925

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US-A-	4988645	29/01/91	NONE		

US-A-	5167944	01/12/92	EP-A-	0469149	05/02/92
			JP-A-	2275772	09/11/90
			WO-A-	9012768	01/11/90

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 94/00925

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: C04B 35/58, C04B 35/65, C04B 41/81, C01B 21/072
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: C01B, C04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DIALOG: WPI, CLAIMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4988645 (JOSEPH B. HOLT ET AL), 29 January 1991 (29.01.91), column 5, line 45 - line 52 --	1-21
A	US, A, 5167944 (MASAHIRO UDA ET AL), 1 December 1992 (01.12.92), column 5, line 51 - line 68, abstract -----	1-15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

- * "A" document defining the general state of the art which is not considered to be of particular relevance
- * "B" earlier document but published on or after the international filing date
- * "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- * "O" document referring to an oral disclosure, use, exhibition or other means
- * "P" document published prior to the international filing date but later than the priority date claimed

* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

* "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

* "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

* "&" document member of the same patent family

Date of the actual completion of the international search

9 May 1994

Date of mailing of the international search report

13.06.94

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

MAY HALLNE

PATENT COOPERATION TREATY

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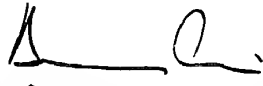
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 40,076A-F	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US 94/00925	International filing date (day/month/year) 27/01/1994	Priority date (day/month/year) 02/04/1993
International Patent Classification (IPC) or national classification and IPC C04B35/38		
Applicant THE DOW CHEMICAL CO. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing recifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consists of a total of 3 sheets.

3. This report contains indications and corresponding pages relating to the following items:
- I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☒ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 10/10/1994	Date of completion of this report 05.04.95
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer  Telephone No. 8560 A. Mini

I. Basis of the report

1. This report has been drawn up on the basis of (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.):

☐ the international application as originally filed.

☒ the description, pages 1-18, 21-25 _____, as originally filed,
pages _____, filed with the demand,
pages 19, 20 _____, filed with the letter of 18.03.94,
pages _____, filed with the letter of _____,

☒ the claims, Nos. 1-16 _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. 17-22 _____, filed with the letter of 09.02.95,
Nos. _____, filed with the letter of _____,

☐ the drawings, sheets/fig _____, as originally filed,
sheets/fig _____, filed with the demand,
sheets/fig _____, filed with the letter of _____,
sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____.

☐ the claims, Nos. _____.

☐ the drawings, sheets/fig _____.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims 1-19, 21 _____	YES
	Claims 20, 22 _____	NO
Inventive Step (IS)	Claims 1-19, 21 _____	YES
	Claims 20, 22 _____	NO
Industrial Applicability (IA)	Claims 1-22 _____	YES
	Claims _____	NO

2. CITATIONS AND EXPLANATIONS

1. None of the cited documents describes a process for producing AlN; AlN-platelets; AlN-complex transition metal carbide and/or boride composites and AlN containing solid solution by combustion synthesis whereby the raw material ignition takes place in the presence of gaseous nitrogen at a pressure of from 0.075 to 3 MPa).

This teaching goes against the suggestion of the closest prior art document US-A-4988645 (D1) which suggests to operate at a nitrogen pressure between 7 and 310 MPa.

Therefore, the subject-matter of Claims 1 to 19 is considered to be novel and to involve an inventive step.

2. Document US-A-4988645 (D1) describes a method for producing ceramic-metal composites and particularly AlN-Al composites of porous structure which may be infiltrated with molten metal (eg Al or Al alloys). Applicant could not convincingly demonstrate and the application does not contain any indication that AlN-Al composites of po-

rous structure obtained by applying a process according to the invention are necessary different from those made according to prior art processes, in particular document D1 (cf. col. 5, line 14 - col 6 line 2 and Claim 18). Indeed, a product is not rendered novel by the mere fact that it is produced by means of a new process.

Therefore, the subject-matter of Claims 20 and 22 is not considered to be novel.

3. None of the cited documents describes or suggests a body of AlN; AlN-platelets; AlN-complex transition metal carbide and/or boride composites and AlN containing solid solution which are infiltrated by polymers.

Therefore, the subject-matter of Claim 21 is considered to be novel and to involve an inventive step.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

To meet the requirements of Art. 41(2) PCT Claim 21 should be amended to specify that the AlN-based body to be polymer infiltrated is produced by the method of Claim 1.

17 A method as claimed in Claim 16, wherein the method further comprises a step intermediate between steps (b) and (c) in which the porous body is coated with a silicate material and subsequently cured at a temperature of 120°C for 0.5 - 2 hours and then cured at a temperature of 550 - 600°C for 0.5 - 2 hours.

5 18. A method as claimed in Claim 17, wherein the silicate material is coated onto internal and external surfaces of the porous body using a coating solution comprising a linear or branched alkyl or alkoxyalkyl silicate, an alkyl alcohol having from 1 to 4 carbon atoms, inclusive, water and, optionally, a hydrolysis catalyst.

10 19. A method as claimed in Claim 18, wherein the coating solution comprises tetraethylorthosilicate, absolute ethanol, water and acetic acid.

20. A product prepared by the method of any of Claims 1-15.

21. A composite body prepared by the method of any of Claims 16-19.

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Ref. back. to 10.076A-F

Table IV

Example	Al Source	% Al	% C	% AlN	Density (g/cm ³)	Yield (% of theoretical)	Morphology Description
A	Al-2	90	10	0	0.75	--	Large (5 X 50 μ m) platelets
B	Al-2	90	5	5	0.70	--	Fine (1-2 μ m) equiaxed
C	Al-1	80	10	10	0.40	--	Large (4 x 40 μ m) platelets
D	Al-1	85	5	10	0.50	--	Fine (1-3 μ m) equiaxed
E	Al-1	85	10	5	0.60	--	Mixture of large and small platelets (1 x 10 μ m and 5 x 50 μ m)
F	Al-1	90	5	5	0.42	--	Mixture of platelets and equiaxed crystals
G*	Al-2	95	5	0	0.83	0	--
H*	Al-2	95	5	0	0.76	0	--
I	Al-2	90	10	0	0.70	68	--
J	Al-2	90	10	0	0.92	68	Large (4 x 60 μ m) platelets
K	Al-2	90	10	0	1.18	29	--
L*	Al-2	95	5	0	0.80	0	--
M	Al-2	35	65	0	0.21	30	--
N	Al-2	35	65	0	0.18	12	--

* = Not an Example of the Invention; -- = not measured

Table IV

Example	Al Source	% Al	% C	% AlN	Density (g/cm ³)	Yield (% of theoretical)	Morphology Description
O	Al-2	50	50	0	0.26	68	--
P	Al-2	70	30	0	0.32	72	--
Q	Al-2	70	30	0	0.50	66	Small (0.6 x 10 μ m) platelets
R	Al-2	70	30	0	0.73	51	--
S	Al-2	50	50	0	0.39	83	Small (1 x 10 μ m) platelets
T	Al-2	50	50	0	0.49	76	--
U	Al-2	35	65	0	0.40	96	Mixture of small (1 x 10 μ m) platelets and fine (103 μ m) equiaxed crystals
V	Al-2	50	50	0	0.53	68	--

* = Not an Example of the Invention; -- = not measured